

REMARKS

In the office action, claims 1-4 and 6-13 have been rejected under 35 U.S.C. §103. In response, Applicant has amended claim 1, cancelled claim 2, and provides the following remarks. Additionally, an unexecuted declaration on behalf of inventor, Dirk Verdoes, is attached hereto. The executed copy will be filed in a supplemental response, once it is received by Applicant's representative. Consequently, claims 1, 3, 4 and 6-13 are pending consideration. Reconsideration is respectfully requested.

In view of the following, and in the interest of moving the application towards allowance, claim 1 has been amended to include the range for the seed particle size of 0.1 to 50 μm (subject-matter of claim 2). Claim 2 has been cancelled.

Claims 1-4, 6, 7, and 9-13 have been rejected under §103(a) as allegedly being unpatentable over WO 04/11309 to Verdoes *et al.* Applicant notes that the cited document is a patent document of the current inventor, Dirk Verdoes, which was filed some 10+ years before the present application's priority date.

According to the Examiner, Verdoes *et al.* disclose a method for removing at least one constituent from a solution "substantially as claimed." The Examiner recognizes that Verdoes *et al.* do not disclose use of a filter wherein the pore size is greater than the particle size of the seed material (as in the instant claims).

However, the Examiner asserts that it would have been obvious to one skilled in the art to modify the method of Verdoes *et al.* by utilizing the recited pore and particle sizes, to aid in removing at least one constituent from the solution. It is the Examiner's position that selection of specific pore and particle size would have been a matter of process optimization to one skilled in the art, depending on the specific solution treated and results desired, absent a sufficient showing of unexpected results.

At the time of the invention, a skilled person would have interpreted the disclosure of Verdoes *et al.* as being limited to embodiments wherein the filter pore size is smaller than the seed particle size. **See paragraph 4 of the Declaration.** There are many indicators in Verdoes *et al.* from which the skilled person would derive this teaching. For instance, reference can be made to the abstract, lines 5-6; page 3, lines 10-11; page 4, lines 34-35; page 6, lines 34-35; and in the various examples.

In particular, the teaching of Verdoes *et al.* that "the filter has such a pore size that the liquid does and the seed material does not permeate through the membrane (emphasis added)" indicates that the filter pore size is smaller than the seed particle size. Moreover, it teaches the skilled person that the filter pore size and the seed particle size must be considered in combination.

Hence, the ranges mentioned in Verdoes *et al.* on page 6, lines 27-35, cannot be freely combined. **See paragraph 5 of the Declaration.** The skilled person would, of course, read these ranges in the context of the entire publication, *i.e.* with the further requirement that the filter pore size must be such that the liquid does and the seed material does not permeate

through the membrane. At the time of the invention, this would have been interpreted by the skilled person as meaning that the filter pore size must be smaller than the seed particle size.

In addition to the above remarks, Applicants provide the following historical review of what events lead to the development of the present invention, especially since the invention disclosed in Verdoes *et al.* stems from the same Applicant.

In a conventional pellet reactor, the seed particle size is so large that no filter is required to separate the particles. The invention described in Verdoes *et al.* was based on the insight that the crystallisation rate is strongly influenced by the available surface. Hence, if the seed particles are relatively large, then the crystallization speed will be relatively low. In Verdoes *et al.* it was convincingly shown that small seeds (*i.a.* due to their significantly larger surface) cause a considerable increase in crystallization rate. At that time, the skilled artisans (including the inventors) were under the assumption that small particles could only be separated by using a filter with pore size smaller than the particles. **See paragraph 6 of the Declaration.** Technically, the process described in Verdoes *et al.* worked excellent, but such filtration is relatively difficult and expensive. For large application water treatments, microfiltration membranes are too expensive for commercial use.

In light of these disadvantages, the inventors searched for an improved process which maintained the advantage of increased crystallisation speed, but had a more economic solid-liquid separation concept. The surprising solution was that open filters having a filter pore size larger than the seed particles size are nevertheless capable of blocking the seed particles. **See paragraph 7 of the Declaration.** The performance of these open filters is

orders of magnitudes better than those of microfiltration membranes due to the higher flux per square meter. In addition, the costs of the open filters are much lower.

It is believed that the open filter is capable of blocking the seed particles, because during start-up, a thin cake builds up on top of the open filter. The combination of the increased crystallization speed coupled with the principle of cake filtration, has lead to a highly effective separation process which is economically feasible, including for large scale applications.

Applicants further include herewith, an article wherein a pellet reactor is compared to a so-called MAC (Membrane Assisted Crystallizer, which is the invention described in Verdoes *et al.*) and a FACT (Filtration Assisted Crystallization Technology, which is the present invention). This article was published in the Proceedings of the 16th International Symposium on Industrial Crystallization, 11-14 September 2005, Dresden (Germany), VDI Berichte Nr. 1901 (Ed. J. Ulrich), 2005, 787-792.

The article clearly shows that the technology of the instant invention (FACT) is distinct from that of Verdoes *et al.* (MAC), and that the unexpected results obtained by the instant invention were not disclosed or contemplated by Verdoes *et al.*

In light of the above, the instant invention is patentable over Verdoes *et al.*
Applicants respectfully request that the Examiner reconsider and withdraw the §103 rejection based on Verdoes *et al.*

It is now believed that the application is in condition for allowance. If the Examiner has any additional issues he believes can be resolved over the telephone, he is invited to contact the undersigned at his convenience.

Respectfully submitted,

/lauren t emr/

Lauren T. Emr, Esq.
Registration No.: 46,139
Attorney for Applicant

HOFFMANN & BARON, LLP
6900 Jericho Turnpike
Syosset, New York 11791
(516) 822-3550
LTE/aca